

## **IEA GHG Weyburn CO<sub>2</sub> Monitoring and Storage Project: Phase 1 Highlights**

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### **Project Objectives**

The overall mission of Phase 1 of the project (launched by the PTRC in 2000) was:

“to assess the technical and economic feasibility of Geological CO<sub>2</sub> Storage in oil reservoirs and develop implementation guidelines for such projects. Implicit in the assessment is the identification of the risks associated with this method of CO<sub>2</sub> storage, especially long-term risk of CO<sub>2</sub> leakage” (from the Mission Statement for Phase 1).

Accomplishing this required establishing comprehensive knowledge of the geological nature of the reservoir and the region where the CO<sub>2</sub> was to be stored, the movement and ultimate geochemical fate of the CO<sub>2</sub> within the reservoir, and the economically viable CO<sub>2</sub> storage capacity of the reservoir. It also required developing an overall risk assessment of the probability and consequences of CO<sub>2</sub> leakage.

### **Phase 1 Highlights**

- This 4-year (2000-04), \$C40 million study involved 15 international private/public-sector sponsors and 22 research/consulting organizations.
- It was conclusively demonstrated that geological settings such as the Weyburn field are highly suitable for long-term geological CO<sub>2</sub> storage.
- Caprock integrity issues were examined and found to be negligible.
- The regional geology provides multiple containment zones, which creates significant redundancy. If CO<sub>2</sub> were to leak past the primary sealing caprock, there are a number of other zones with sealing caprock and several saline aquifers above the primary storage zone.
- Great success with seismic surveys was achieved. The CO<sub>2</sub> could actually be ‘seen’ in the reservoir. Additionally, the seismic data generally supported the reservoir simulation.
- Geochemical fluid sampling yielded good insight into the movement of CO<sub>2</sub> within the reservoir. Furthermore, the fluid sampling provided strong indications of incipient CO<sub>2</sub> breakthrough at producing wells.
- A model to predict the storage capacity of the reservoir was successfully constructed and history matched.
- A generic economic model was constructed and used to examine alternate storage scenarios.
- The risk assessment model predicted that less than 3% of the initial CO<sub>2</sub> injected may migrate out of the Weyburn reservoir EOR area during the 5000 years following the end of EOR operations.
- The risk assessment model predicted that CO<sub>2</sub> will never reach nor penetrate overlying saline water zones through geological formations, nor will it reach either potable water zones closer to the surface or the ground surface above the storage reservoir.
- There remains an identified need to continue this research into a second phase.

### **Phase 2 (planned) Expected Deliverables**

- A hub of excellence in risk assessment of CO<sub>2</sub> geological storage (PTRC enabling connectivity of international expertise and research efforts).
- A risk assessment model/process with monitoring protocol for use by regulators and industry.
- A ‘Best Practices Manual for Development and Operation of CO<sub>2</sub> Geological Storage Projects (anywhere in the world).
- An advanced data set to serve as a resource for existing and future CO<sub>2</sub> geological storage projects.